What Is Claimed Is:

1. A method for distance measurement using a radio system having first and second radio transceivers, said first radio transceiver having a transmit time base and a receive time base and said second radio transceiver having a further time base, comprising the steps of:

transmitting a first pulse train using the transmit time base from the first radio transceiver, the first pulse train having *N* pulses, where *N* is an integer number;

receiving the first pulse train at the second radio transceiver and synchronizing its time base with the first pulse train;

transmitting a second pulse train from the second radio transceiver, the second pulse train having *N* pulses;

receiving the second pulse train at the first radio transceiver and synchronizing the receive time base with the second pulse train;

determining a time delay between the transmit and receive time bases, the time delay indicating the total time of flight of the first and second pulse trains;

determining a coarse distance between the first and second radio transceivers from the time delay, the coarse range distance representative of the distance between the first and second radio transceivers in coarse resolution;

generating an inphase (I) and a quadrature (Q) signal from the time delay;

determining a fine distance between the first and second transceivers from the I and Q signals, the fine distance indicating the distance between the first and second transceivers in fine resolution; and

determining the distance between the first and second transceivers from the coarse distance and the fine distance.

2. The method of claim 1, wherein the determination of coarse distance further comprising the steps of:

generating a transmit timing signal from the transmit time base;

dividing the transmit timing signal by K using a first counter, K being an integer number, and outputting a first timing signal;

receiving the first timing signal at a first code position counter and outputting a first count value;

generating a receive timing signal from the receive time base;

dividing the receive timing signal by K at a second counter, and outputting a second timing signal;

receiving the second timing signal at a second code position counter and outputting a second count value;

receiving the first count value at the data input port of a latch and the second count value at the enable port of the latch, and outputting a code delay value, and

determining a coarse distance value from the code delay value and a base count value, the base count value being representative of the number of pulses in the first or second pulse train.

3. The method of claim 2, wherein the generation of each of said transmit timing signal and receive timing signal further comprising the steps of:

generating a base clock signal having a first frequency from a voltage controlled oscillator;

dividing the base clock signal using a counter to a second frequency, the second frequency being lower than the first frequency;

generating a reference signal having the second frequency from a reference signal generator;

determining a phase difference between the divided base clock signal and the reference signal at a phase detector;

receiving the phase difference at a phase locked loop (PLL) filter and outputting an error signal;

receiving the error signal at the voltage controlled oscillator to thereby adjust the voltage controlled oscillator, and

wherein said divided base clock signal is utilized as the receive or transmit timing signal.

4. The method of claim 2, wherein said fine distance determination further comprising the steps of:

dividing the first timing signal by N1 at a third counter, N1 being an integer, and outputting a TX(I) signal;

receiving the first timing signal and the TX(I) signal at a first gate, comparing the phase of the first timing signal to the phase of the TX(I) signal, and outputting a TX(Q) signal, the TX(Q) signal having a duty cycle proportional to the phase difference between said first timing signal and the TX(I) signal;

dividing the second timing signal by N1 at a fourth counter, N1 being an integer, and outputting a RX signal;

receiving the TX(I) signal and the RX signal at a second gate, comparing the phase of the TX(I) signal to the phase of the RX signal, and outputting the I signal, wherein the I signal has a duty cycle proportional to the phase difference between the TX(I) signal and the RX signal; and

receiving the TX(Q) signal and the RX signal at a third gate, comparing the phase of the TX(Q) signal to the phase of the RX signal, and outputting the Q signal, wherein the Q signal has a duty cycle proportional to the phase difference between the TX(Q) signal and the RX signal.

5. The method of claim 4, further comprising the steps of:

receiving the I signal at a first low pass filter, removing the ac component from the I signal, and outputting an I_{dc} signal, the I_{dc} signal having an average dc value of the I signal;

receiving the Q signal at a second low pass filter, removing the ac component from the Q signal, and outputting a Q_{dc} signal having an average dc value of the Q signal;

receiving the I_{dc} signal at a first analog to digital (A/D) converter and outputting a first digital output having a value between a maximum value and a minimum value;

receiving the Q_{dc} signal at a second analog to digital (A/D) converter and outputting a second digital output having a value between the maximum value and the minimum value; and

determining the fine distance from the first and second digital outputs.

6. The method of claim 5, wherein determining the fine distance from the first and second digital outputs comprising the steps of:

generating an I triangular waveform from the first digital output; and

generating a Q triangular waveform from the second digital output.

7. The method of claim 6, further comprising the steps of:

dividing the I and Q triangular waveforms into four quadrants;

normalizing the I and Q triangular waveforms by a common mid point for the I and Q triangular waveforms; and

resolving the ambiguities of the first and second digital outputs from the I and Q triangular waveforms.

8. The method of claim 7, wherein resolving the ambiguities of the first and second digital values further comprising the steps of:

determining a quadrant location of the of range from the I and Q triangular waveforms; and

determining the actual distance of the second transceiver from the I triangular waveform.

9. A system for distance measurement using a radio system, comprising:

a first radio transceiver having a transmit time base and a receive time base;

a second radio transceiver having a further time base;

a time delay circuit for determining a delay between the transmit and receive time bases;

a coarse distance measurement circuit for measuring the coarse distance between the first and second radio transceivers from the time delay, the coarse range distance being representative of the distance between the first and second radio transceivers in coarse resolution; and

a fine distance measurement circuit for generating an I signal and a Q signal from the time delay and for determining a fine distance between the first and second radio transceivers from the I and Q signals, the fine distance indicating the distance between the first and second transceivers in fine resolution,

wherein the distance between the first radio transceiver and the second radio transceiver is determined from the coarse distance and the fine distance.

10. The system of claim 9, wherein the coarse distance measurement circuit comprising:

a first counter for dividing the transmit timing signal by *K*, *K* being an integer, and outputting a first timing signal;

a first code position counter for receiving the first timing signal and outputting a first count value;

a second counter for dividing the receive timing signal by K and outputting a second timing signal;

a second code position counter for receiving the second timing signal and outputting a second count value; and

a latch for receiving the first count value and the second count value and outputting a code delay value,

wherein the coarse distance is determined from the code delay value and a base count value, the base count value being representative of the number of pulses in the first or second pulse train.

11. The system of claim 9, wherein the fine distance measurement circuit comprising:

a third counter for dividing the first timing signal by N_I, N_I being an integer, and outputting a TX(I) signal;

a first gate for receiving the first timing signal and the TX(I) signal, comparing the phase of the first timing signal to the phase of the TX(I) signal, and outputting a TX(Q) signal, the TX(Q) signal having a duty cycle proportional to the phase difference between said first timing signal and the TX(I) signal;

a fourth counter for dividing the second timing signal by N_I, N_I being an integer, and outputting a RX signal;

a second gate for receiving the TX(I) signal and the RX signal, comparing the phase of the TX(I) signal to the phase of the RX signal, and outputting the I signal, wherein the I signal has a duty cycle proportional to the phase difference between the TX(I) signal and the RX signal, and

a third gate for receiving the TX(Q) signal and the RX signal, comparing the phase of the TX(Q) signal to the phase of the RX signal, and outputting the Q

signal, wherein the Q signal has a duty cycle proportional to the phase difference between the TX(Q) signal and the RX signal.

12. The system of claim 11, further comprising:

a first low pass filter for receiving the I signal, removing the ac component from the I signal, and outputting an I_{dc} signal, the I_{dc} signal having an average dc value of the I signal;

a second low pass filter for receiving the Q signal, removing the ac component from the Q signal, and outputting a Q_{dc} signal having an average dc value of the Q signal;

a first analog to digital (A/D) converter for receiving the I_{dc} signal and outputting an I_1 signal;

a second A/D converter for receiving the Q_{dc} signal and outputting a Q_1 signal,

wherein the fine distance is determined from the I_1 and Q_1 signals.